



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/574,120

05/31/2007

Michel Bruel

5310-09500

7416

35690

7590

02/03/2011

MEYERTONS, HOOD, KIVLIN, KOWERT & GOETZEL, P.C.

P.O. BOX 398

AUSTIN, TX 78767-0398

EXAMINER

KHARE, ATUL P

ART UNIT

PAPER NUMBER

1742

NOTIFICATION DATE

DELIVERY MODE

02/03/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent\_docketing@intprop.com

ptomhkg@gmail.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/574,120	<b>Applicant(s)</b> BRUEL, MICHEL	
	<b>Examiner</b> ATUL KHARE	<b>Art Unit</b> 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7,9-11,14-20 and 29-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7,9-11,14-20 and 29-33 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 19 November 2010 has been entered.

### ***Response to Amendment***

2. The amendment filed 19 November 2010 has been entered and fully considered.
3. Claims 1, 3-5, 7, 9-11, 14-20, and 29-33 are currently pending. Claims 2, 6, 8, 12, 13, and 21-28 are canceled.
4. No new matter has been found.

### ***Claim Objections***

5. Claims 9 and 10 are objected to because of the following informalities: Each claim should be corrected to depend from claim 7 since claim 8 has been canceled and incorporated into claim 7. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1, 3-5, and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Habberger et al. (US 6,417,075) in view of Moriceau et al. (WO 99/35674). For examination, US 6,756,286 will be used as an English Language Equivalent for WO 99/35674.

9. As to claim 1, Habberger teaches a method for fabricating a structure in the form of a plate (abstract), the method comprising:

depositing at least one intermediate layer 5 on a substrate 2 (4:61-64, 6:14-22, figure 2a), wherein the substrate is formed from monocrystalline silicon (4:4-5, 1:23-27) and wherein the intermediate layer is formed from doped silica comprising extrinsic atoms of phosphorus or boron and phosphorus to form PSG or BPSG (7:66-8:3);

bonding a superstrate 1 to the intermediate layer by thermal bonding (5:5-6) or silicon fusion bonding (6:19-22) (at least one of which meets molecular wafer bonding), wherein the superstrate is formed from monocrystalline silicon (4:4-5, 1:23-27); and

processing the wafer stack so that the intermediate layer can later serve as a sacrificial layer (4:6-13) and be used as a point of separation between the substrate and superstrate (abstract, 6:45-51).

Haberger does not appear to explicitly disclose applying a heat treatment to the structure at a temperature range that produces microbubbles or microcavities which weaken the intermediate layer and render it plastically deformable. However, Moriceau teaches that heat treatment of silicon or silicon oxide materials can be used to help precipitate oxygen and generate stresses in the material so that it becomes deformable (9:30-67, 4:10-13, 4:26-29, 4:42-44). The precipitation of oxygen and the generation of stresses implicitly forms of the claimed microbubbles or microchannels (MPEP 2112(I-III)). It would have been obvious to incorporate Moriceau's heat treatment into the Haberger method because (a) Moriceau's heat treatment is an obvious variant for the unspecified processing technique already used by Haberger to render the intermediate oxide suitable as a sacrificial layer, or (b) Moriceau's heat treatment would have advantageously helped to facilitate subsequent separation at the intermediate sacrificial layer. Since the modified method treats the same materials with the same process steps, it is expected that the same result (formation of microbubbles or microchannels) is a necessary result (MPEP 2112(I-III)).

Art Unit: 1742

10. As to claims 3 and 4, Haberger teaches using an etchant to rupture the intermediate layer to separate the substrate and superstrate (6:45-51), but Haberger does not appear to explicitly disclose utilizing heat treatment to cause rupture at this layer. However, Moriceau teaches that heat treatment can be used to cause rupture at this layer (4:10-13, 4:26-29, 4:42-44). It would have been obvious to substitute Moriceau's heat treatment separation process for Haberger's etching separation process since these are both suitable for causing rupture at the intermediate layer.

11. As to claim 4, Haberger teaches using an etchant to rupture the intermediate layer to separate the substrate and superstrate (6:45-51), which meets the claimed application of force.

12. As to claim 5, Haberger teaches chemically attacking the intermediate layer to at least partially remove the intermediate layer between the substrate and superstrate (6:45-51).

13. As to claim 29, Haberger's layers 4 or 5 on substrate 2 or layer 3 on superstrate 1 meet the claimed projecting portion. Alternatively, it would have been obvious to additionally form projecting portions 5 on layer 3 of superstrate 1 because (a) this would have been an obvious duplication of layer 5 which is already taught by Haberger (MPEP 2144.04(VI)(B)), or (b) this would have helped permit subsequent entry of an etchant to rupture the intermediate layer (Haberger abstract, 6:14-22).

14. As to claim 30, Haberger teaches that the projecting portions are rectilinear (6:14-22).

Art Unit: 1742

15. As to claim 31, at least some of the microbubbles or microcavities taught by modified Habberger (see the rejection of claim 7 above) are implicitly open-celled, and at least some thereof constitute channels (Habberger 6:14-22, MPEP 2112(I-III)).

16. As to claim 32, Habberger teaches reducing the thickness of the substrate and/or superstrate (5:5-10).

17. As to claim 33, the modified Habberger method is applied for the claimed intended use (Habberger abstract, 3:60-63, MPEP 2111.02(II)).

18. Claims 7, 9-11, and 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Habberger et al. (US 6,417,075) in view of Moriceau et al. (WO 99/35674) and Stierman et al. (US 4,979,015). For examination, US 6,756,286 will be used as an English Language Equivalent for WO 99/35674.

19. As to claim 7, Habberger teaches a method for fabricating silicon wafers (abstract, 8:4-14), comprising:

depositing at least one intermediate layer 5 on a substrate 2 (4:61-64, 6:14-22, figure 2a), the intermediate layer comprising at least one base material formed from silica and comprising extrinsic atoms of phosphorus or boron and phosphorus to form PSG or BPSG (7:66-8:3), and the intermediate layer implicitly being dielectric (since it is comprised of the same dielectric material which Applicant uses);

bonding a superstrate 1 to the intermediate layer by thermal bonding (5:5-6) or silicon fusion bonding (6:19-22) (at least one of which meets molecular wafer bonding);  
and

processing the wafer stack so that the intermediate layer can later serve as a sacrificial layer (4:6-13) and be used as a point of separation between the substrate and superstrate (abstract, 6:45-51).

Haberger does not appear to explicitly disclose applying a heat treatment to the structure at a temperature range that produces microbubbles or microcavities which weaken the intermediate layer and render it plastically deformable. However, Moriceau teaches that heat treatment of silicon or silicon oxide materials can be used to help precipitate oxygen and generate stresses in the material so that it becomes deformable (9:30-67, 4:10-13, 4:26-29, 4:42-44). The precipitation of oxygen and the generation of stresses implicitly forms of the claimed microbubbles or microchannels (MPEP 2112(I-III)). It would have been obvious to incorporate Moriceau's heat treatment into the Haberger method because (a) Moriceau's heat treatment is an obvious variant for the unspecified processing technique already used by Haberger to render the intermediate oxide suitable as a sacrificial layer, or (b) Moriceau's heat treatment would have advantageously helped to facilitate subsequent separation at the intermediate sacrificial layer. With the incorporation of Moriceau into Haberger, the intermediate layer is implicitly selected to become plastically deformable with the application of heat treatment (as claimed). Since the modified method treats the same materials with the same process steps, it is expected that the same result (formation of microbubbles or microchannels) is a necessary result (MPEP 2112(I-III)).

Although Haberger teaches that the substrate and superstrate respectively comprise a silicon oxide 3 and 4 (6:14-22), Haberger does not appear to explicitly



Art Unit: 1742

disclose that this silicon oxide is a thermal silicon oxide. However, Stierman teaches in a similar manufacturing method: creating a thermal silicon oxide layer by treating a deposited layer of silicon in a furnace (4:59-63). It would have been obvious to incorporate the Stierman method for forming a (thermal) silicon oxide as a conventional alternative or substitutable method for depositing the oxide layer onto a silicon substrate in the modified Habberger method.

20. As to claims 9 and 10, Habberger does not appear to explicitly disclose the concentration of phosphorus or boron in the intermediate layer. However, Moriceau teaches that the doping level of similar silicon materials is a result-effective variable that a person having ordinary skill in the art would have readily optimized as a matter of routine experimentation (5:20-33, 7:32-37, MPEP 2144.05(II)). It would have been obvious to incorporate the Moriceau teaching into modified Habberger to meet the claimed ranges since the level of doping is a result-effective variable that would have influenced the intermediate layer's properties as a sacrificial layer.

21. As to claim 11, Moriceau teaches that the heat treatment is carried out above 1000 °C (9:30-46, MPEP 2144.05(I)).

22. As to claim 14, Habberger teaches chemically attacking the intermediate layer to bring about separation of the substrate and superstrate (6:45-51), which constitutes an application of force. Moriceau additionally teaches that the application of force can be used to separate such layers (4:26-29), and it would have been obvious to incorporate this teaching into modified Habberger to help separate the substrate and superstrate at the sacrificial intermediate layer.

Art Unit: 1742

23. As to claim 15, Haberman teaches chemically attacking the intermediate layer to bring about separation of the substrate and superstrate (6:45-51).

24. As to claim 16, Haberman's layers 4 or 5 on substrate 2 or layer 3 on superstrate 1 meet the claimed projecting portion. Alternatively, it would have been obvious to additionally form projecting portions 5 on layer 3 of superstrate 1 because (a) this would have been an obvious duplication of layer 5 which is already taught by Haberman (MPEP 2144.04(VI)(B)), or (b) this would have helped permit subsequent entry of an etchant to rupture the intermediate layer (Haberman abstract, 6:14-22).

25. As to claim 17, Haberman teaches that the projecting portions are rectilinear (6:14-22).

26. As to claim 18, at least some of the microbubbles or microcavities taught by modified Haberman (see the rejection of claim 7 above) are implicitly open-celled, and at least some thereof constitute channels (Haberman 6:14-22, MPEP 2112(I-III)).

27. As to claim 19, Haberman teaches reducing the thickness of the substrate and/or superstrate (5:5-10).

28. As to claim 20, the modified Haberman method is applied for the claimed intended use (Haberman abstract, 3:60-63, MPEP 2111.02(II)).

### ***Response to Arguments***

29. Applicant's arguments with respect to claim amendments have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kurtz (US 2003/0178704) teaches that silicon fusion bonding creates a molecular bond between two silicon wafers [0018]. Kim (KR 2004/057636) teaches a method for forming a BPSG layer by forming bubbles using ion implantation and annealing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ATUL KHARE whose telephone number is (571)270-7608. The examiner can normally be reached on Monday-Thursday 7:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571)272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeff Wollschlager/  
Primary Examiner, Art Unit 1742

/ATUL KHARE/  
Examiner, Art Unit 1742